

Pagurus retrorsimanus (Crustacea: Decapoda: Paguridae), a new and distinctive hermit crab from the eastern Pacific

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Abstract.—*Pagurus retrorsimanus*, a new and distinctive hermit crab species from the eastern Pacific of the genus *Pagurus* Fabricius, is described and illustrated. It is immediately distinguished from other representatives of the genus in the region by its extremely massive right cheliped.

While sorting and identifying specimens of hermit crabs from the collections of the Allan Hancock Foundation, now transferred to the Los Angeles County Museum of Natural History (LACM), we discovered a very unusual and undescribed hermit crab. One of us (MKW) and other divers observed and photographed the crab in life on rocky reefs of California. The hermit crab is described herein.

The material used for this study is deposited in the collections of the Los Angeles County Museum of Natural History. The shield length, abbreviated as SL, has been measured in millimeters from the tip of the rostrum to the midpoint of the posterior margin of the shield, and is indicated in parenthesis in the material examined; ov. indicates ovigerous female.

Pagurus retrorsimanus, new species
Figs. 1, 2

Pagurus sp. 2: Jensen 1995: 67, fig. 126.

Holotype.—Male (SL 4.8), LACM number 40-113.13. Off Redondo Beach, Los Angeles County, California (33°49'55"N, 118°23'50"W), 20–37 m, gravel, 6 May 1940, *Velero III* sta. 1139–40.

Paratypes.—California, U.S.A.: Off Cannery Row, Monterey, 11 m, on reef, 25 Jan 1975, coll. M.K. Wicksten, 1 male (SL

3.8). Naples Reef, ca. 18 mi. N. of Santa Barbara, 11–15 m, Jun–Jul 1976, coll. Gary Robinson, female ov. (SL 3.1), male (SL 3.6), male (SL 4.0). Becher's Bay, Santa Rosa Is., 18 m, sand, 2 Aug 1938, *Velero III* sta. 881-38, female ov. (SL 3.2), female (SL 4.3). Becher's Bay, 18 m, sand and corallines, 10 Aug 1939, *Velero III* sta. 995-39, female ov. (SL 2.8), male (SL 2.5), female (SL 2.8), female (SL 2.4), female (SL 1.4), male (SL 1.5). Becher's Bay, 26 m, sand and shell, 18 Aug 1939, *Velero III* sta. 1003-39, male (SL 2.6). 2.6 mi. 360° True to E. Point, Santa Rosa Is., 50 m, 7 Nov 1975, *Velero IV* sta. 23206, female ov. (SL 2.8). 2.6 mi. 230° True to Diablo Pt., Santa Cruz Is., 85–90 m, 27 Apr 1976, *Velero IV* sta. 24867, male (SL 2.9). 2.6 mi. 105° True to Fraser Pt., Santa Cruz Is., 44–66 m, 28 Apr 1976, *Velero IV* sta. 24873, male (SL 2.5). Off Redondo Beach, 20–37 m, gravel, 6 May 1940, *Velero III* sta. 1139–40, female (SL 3.3), female (SL 3.8). Off Redondo Beach, 46 m, gravel, May 1941, coll. J. Burch, female (SL 3.2). Off Redondo Beach, 18–36 m, 31 Aug 1940, coll. T. Burch, female (SL 4.7), male (SL 5.5). Off Redondo Beach, 16 Jul 1939, Burch sta. 3919, male (SL 3.1). Point Loma, San Diego, 12 m, "Grid 15," 23 Oct 1975, male (SL 6.2), with parasitic rhizocephalan. Baja California Norte, Mexico: Los Coronados

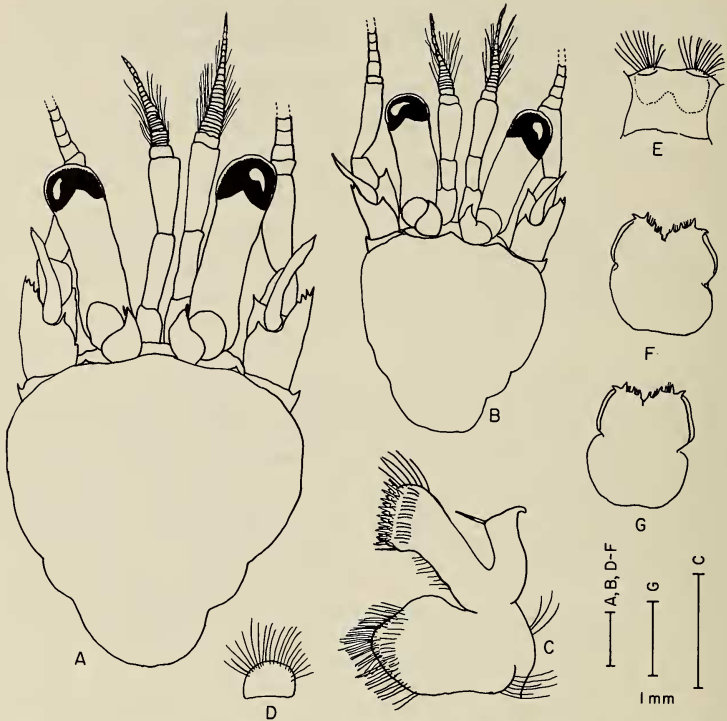


Fig. 1. *Pagurus retrorsimanus*, new species. A, shield and cephalic appendages of male; B, shield and cephalic appendages of female; C, maxillule of male; D, anterior lobe of sternite of third pereopods of male; E, sternite of fifth pereopods of male; F, telson of male; G, telson of female. Scales equal 1.0 mm.

Islands, 28 m, 19 Jul 1901, *Elsie* sta. LIX-H1, female ov. (SL 3.6), male (SL 3.4), male (SL 3.8), male (SL 5.7).

Description.—Shield (Fig. 1A, B) longer than broad (females) to slightly broader than long (males); anterior margin between rostrum and lateral projections usually slightly concave; posterior margin truncate or rounded. Dorsal surface of shield with scattered setae, anterior half granulate. Rostrum triangular, broadly rounded, or obsolete. Lateral projections obsolete or weakly

produced, and with small marginal or submarginal spine. Interocular lobes weakly developed. Ocular peduncles approximately $\frac{1}{3}$ length of shield, but overreached by both antennular and antennal peduncles; corneae slightly dilated. Ocular acicles triangular or subovate, with moderate to strong submarginal spine; separated basally by less than basal width of 1 acicle.

Antennular peduncles overreaching corneae by $\frac{1}{3}$ to $\frac{1}{2}$ length of ultimate segment; unarmed.

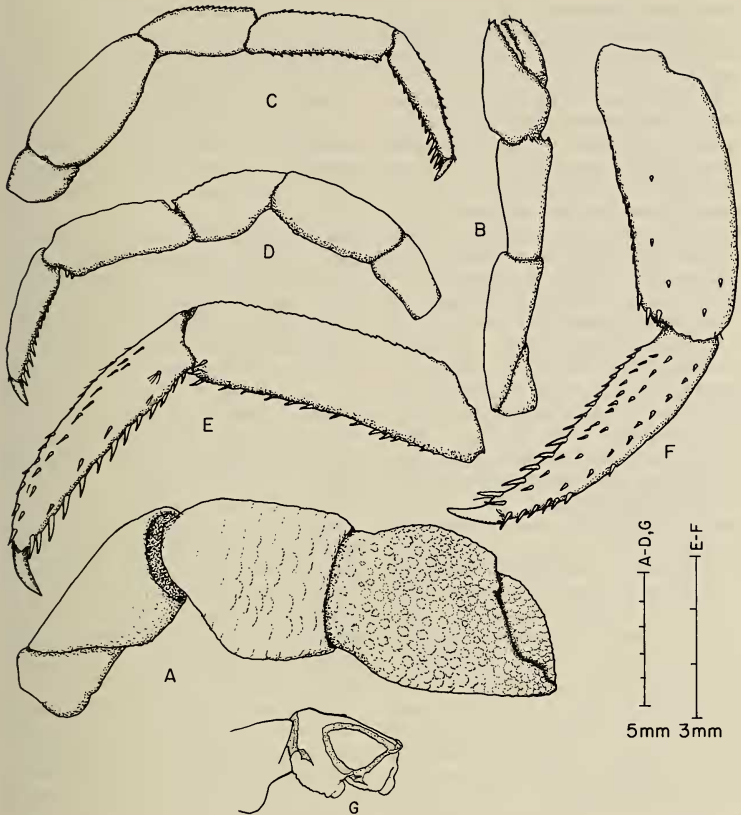


Fig. 2. *Pagurus retrorsimanus*, new species. A, right cheliped (dorsolateral view); B, left cheliped (dorsal view); C, right second pereopod (lateral view); D, left third pereopod (lateral view); E, dactyl and propodus of left second pereopod (mesial view); F, dactyl and propodus of left third pereopod (mesial view); G, merus of right cheliped (mesial view). Scales equal 3.0 mm (E, F) and 5.0 mm (A-D, G). Note: 2G was drawn from a different specimen than that illustrated in A-F.

Antennal peduncle overreaching corneae by $\frac{1}{8}$ to $\frac{1}{4}$ length of ultimate segment. Fifth and fourth segments unarmed. Third segment with spine at ventrodistal margin. Second segment with dorsolateral distal angle produced, terminating in simple or bifid

spine and often with 2 or 3 accessory spinules on mesial margin; dorsomesial distal angle with small spine. First segment with small spine on dorsolateral distal margin; ventral margin produced and with 3 or 4 small spines laterally. Antennal acicle mod-

erately short, terminating in small spine, and with row of tufts of setae on mesial margin. Antennal flagellum with very few scattered setae.

Palp of mandible 3-segmented. Maxillule (Fig. 1C) with external lobe of endopod somewhat produced, slightly recurved. Maxilla with endopod slightly overreaching scaphognathite. First maxilliped with moderately slender exopod; endopod approximately $\frac{2}{3}$ length of exopod. Third maxilliped with well developed crista dentata and 1 accessory tooth; merus and carpus unarmed. Sternite of third maxillipeds with small spine on either side of midline.

Right cheliped (Fig. 2A) extremely massive; dactyl $\frac{1}{3}$ to $\frac{1}{2}$ length of palm; articulating obliquely with very short fixed finger; cutting edge of dactyl with 1 very broad calcareous tooth proximally and 3 smaller calcareous teeth distally, terminating in strong calcareous claw; cutting edge of fixed finger with broad calcareous tooth proximally and few smaller calcareous teeth distally, terminating in strong calcareous claw. Palm very broad and dorsoventrally compressed, dorsomesial and dorsolateral margins not delimited. Dorsal and ventral surfaces of dactyl, fixed finger, and palm all with flattened, plate-like tubercles, particularly densely packed marginally. Carpus short and broad, with lateral face strongly produced ventrally, dorsolateral and dorsomesial margins not delimited, distal margin tuberculate; all surfaces covered with densely packed flattened tubercles at least in distal halves. Meral-carpal articulation twisted at approximately 75° counterclockwise. Merus approximately as long as carpus, with few blunt spinules on dorsodistal margin and row of small spinules on distomesial margin; ventrolateral margin with row of small acute or blunt spinules distally; ventromesial margin with strong, broad, blunt tubercle. Ischium with row of blunt or acute tubercles on ventromesial margin.

Left cheliped (Fig. 2B) reaching only to proximal half of right palm. Dactyl nearly $1\frac{1}{2}$ times longer than palm; cutting edge

with row of closely-spaced corneous teeth, terminating in small corneous claw; dorsal surface unarmed, but with few scattered setae distally, ventral surface with row of tufts of stiff setae. Fixed finger with 2 or more rows of tufts of stiff setae on ventral surface, dorsal surface with few tufts adjacent to cutting edge, latter with row of small calcareous teeth interspersed with corneous teeth and terminating in small corneous claw. Palm and fixed finger roundly triangular in cross section, margins not delimited; dorsal surface sometimes with few minute spinules or tubercles on mesial half. Carpus approximately twice length of palm and equal to length of merus; subtriangular; dorsal surface with irregular single or double row of very small spines, extending onto mesiodistal margin; ventrolateral margin with few spines distally. Merus subtriangular; ventromesial and ventrolateral margins each with row of small to minute spinules. Ischium unarmed.

Second left and right pereopods (Fig. 2C, E) and third right pereopod similar; third left with distinctly different dactyl and propodus from these (Fig. 2D, F). Dactyls of second and right third approximately as long and broad as propodi; ventral margins with 10–14 corneous spines on ventral margins; dorsal margins with irregular row of small corneous spinules or bristles, mesial faces each with dorsal and ventral rows of corneous spinules. Propodi each with 2 or 3 corneous spines at ventrodistal angle and row of small corneous spines on ventral margins. Carpi with row of very small spinules on dorsal margins, strongest on second. Meri with 1 or 2 rows of minute spinules on ventral margins. Ischia unarmed. Third left pereopod with dactyl slightly longer than propodus, broader (in lateral view) proximally and tapering to claw; ventral margin with 13 or 14 corneous spines; mesial face with single row (dorsally) and double row (ventrally) of small corneous spines. Propodus also broad (in lateral view), ventral margin with row of minute corneous spinules, 3 or 4 stronger spinules

at distal angle. Carpus, merus, and ischium as in third right.

Sternite of third pereopods with subsemicircular, setose anterior lobe (Fig. 1D). Sternite of fifth pereopods (Fig. 1E) with 2 broadly separated, setose lobes.

Fourth pereopods without definitive preungual process at base of claw. Proposal rasp consisting of several rows of corneous scales.

Uropods markedly asymmetrical. Telson (Fig. 1F, G) with distinct transverse suture; posterior lobes separated by shallow median cleft; terminal margins oblique, each armed with 3–5 strong spines and several smaller spines, outermost, and sometimes also innermost, strongest; lateral margins weakly chitinized.

Color in life.—Ocular peduncles and antennules dark, translucent blue. Dark blue ring at base of ocular peduncles. Antennal flagellum translucent reddish. Third maxillipeds orange-red. Shield flesh-colored, with two large and few smaller brown spots. Walking legs, entire minor cheliped and major cheliped except for propodus and dactyl covered with dark red specks, giving crab a reddish color when seen from a distance. Palm and fingers of major chela usually bone white, rarely also covered with red specks.

Distribution.—Monterey, California to Los Coronados Islands, Baja California Norte, Mexico; 11–90 m.

Etymology.—The specific name is derived from the Latin *retorsus* meaning bent or turned backward, and *manus* meaning hand. The name is a noun in apposition. In life, the major chela is bent underneath the body and appears to be turned backwards.

Remarks.—*Pagurus retrorsimanus* is distinguished not only by its massive right chela but also by the very broad, blunt tubercle on the ventromesial margin of the merus of the right cheliped. At first glance, the shape, structure and positioning of the right chela with the dorsal surface in a lateral position are reminiscent of the left chelipeds of some *Calcinus* species. However, in *Calcinus*, as well as in other diogenid genera such as *Dar-*

danus, it is the carpal-propodal articulation that is twisted from the perpendicular. In *P. retrorsimanus*, it is in the meral-carpal articulation that the twisting occurs.

This species exhibits sexual dimorphism, but in a manner different from other *Pagurus* species. Rather than the right cheliped exhibiting dimorphic attributes, in *P. retrorsimanus* large males (SL > 5.0 mm) are characterized by an obsolete or markedly reduced rostrum, a shield that is broader than long and having a nearly straight or only very weakly concave anterior margin, and a telson with only the outermost spines appreciably larger. In contrast, females have triangular, acute rostra, shields that are appreciably longer than broad, with distinctly concave anterior margins, and telson with strong spines in the innermost as well as outermost positions.

Pagurus retrorsimanus does not appear to have any close relatives among eastern Pacific *Pagurus* species. It shares with *Pagurus hemphilli* (Benedict 1892) the ventrally produced carpus of the right cheliped and the slightly recurved external endopodal lobe of the maxillule (cf. McLaughlin, 1974), but there the similarity ends.

Acknowledgments

The late Janet Haig of the University of Southern California was the first to recognize this hermit crab as an undescribed species, and located specimens of it among the collections of the Allan Hancock Foundation. The figures were drawn by G. Fain Hubbard. This is a scientific contribution from the Shannon Point Marine Center.

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